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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/817,154	03/27/2001	Norihiko Kiritani	50195-257	7093
7590 05/04/2004 McDERMOTT, WILL & EMERY 600 13th Street, N.W. Washington, DC 20005-3096			EXAMINER TOLEDO, FERNANDO L	
			ART UNIT 2823	PAPER NUMBER

DATE MAILED: 05/04/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/817,154

Applicant(s)

KIRITANI, NORIHIKO *OK*

Examiner

Fernando L. Toledo

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 15 March 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-12, 17, 19 and 20 is/are pending in the application.
- 4a) Of the above claim(s) 19 and 20 is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1-12 is/are allowed.
- 6) ☒ Claim(s) 17 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 27 March 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Palmour, John (U. S. patent 5,459,107) in view of Ueno, Katsunori (U. S. patent 6,265,326 B1).

3. In re claim 17, Palmour discloses depositing a silicon film 13 at the surface of the SiC substrate; annealing the SiC substrate to grow the gate oxide film at the surface of the SiC substrate (Figure 3B).

Palmour does not disclose annealing in water rich environment and annealing the gate oxide film in a water rich environment at a substrate temperature equal to or lower than the substrate temperature at which the gate oxide film is formed so as to reduce interface density between the gate oxide film and the SiC substrate.

Ueno discloses that to increase the rate of speed of formation of a thermal oxide film of a silicon carbide semiconductor device, the partial pressure of water is controlled within a range of 0.1 to 1 (Figure 4).

It would have been obvious to one having ordinary skill in the art at the time the invention was made annealing in water rich environment and annealing the gate oxide film in a water rich environment at a substrate temperature equal to or lower than the substrate

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temperature at which the gate oxide film is formed so as to reduce interface density between the gate oxide film and the SiC substrate in the invention of Palmour, since as taught by Ueno, to increase the rate of speed of formation of a thermal oxide film of a silicon carbide semiconductor device, the partial pressure of water is controlled within a range of 0.1 to 0.95.

Palmour in view of Ueno does not disclose so as to reduce interface density between the gate oxide as in the instant application.

The recited results would be obtained because the same materials are treated in the same manner as in the instant invention.

Allowable Subject Matter

4. Claims 1 – 12 are allowed over the prior art of record.

Response to Arguments

5. Applicant's arguments filed 15 March 2004 have been fully considered but they are not persuasive for the following reasons.

6. Applicant contests that Palmour does not show depositing a silicon film on the silicon carbide substrate. Applicant contests that the epitaxial layer 13 cannot be deposited due to the crystallographic arrangement of the substrate. Applicant states the following:

[T]he object of the invention of Palmour is to provide a method, and resulting structures, of obtaining high quality passivation layers on silicon carbide surfaces...the p-type 6H-epitaxial layer 12 on which the passivation layer 19 is formed as shown in Fig. 3(b), must be silicon carbide. Therefore, it is evident that Palmour fails to show claimed step of depositing a silicon film at the surface of the SiC substrate, and therefore the method of Palmour substantially differs from the method of claim 17.

Examiner respectfully submits that the epitaxial layer, as stated in the reference of Palmour is layer 13, which is a silicon layer as pointed out by Applicant. Palmour does show depositing (i.e. epitaxially forming) a silicon layer on the surface of a SiC substrate as evidenced by Applicant's arguments on pages 9 and 10 of the Remarks filed on 15 March 2004. It is very well known in the art that epitaxial layers are formed by chemical vapor deposition (CVD) processes, which inherently **deposits** the epitaxial layer on the surface of a substrate.

7. Applicant also contests that the conclusion which states that the "recited results would be obtained because the same materials are treated in the same manner as in the instant invention" is not understood since there was no explanation on what reference teaches treating the materials in the same manner.

Examiner respectfully submits that the combination of Palmour and Ueno teaches all the limitations of claim 17 except "to reduce interface density between the gate oxide and said SiC substrate". However, the combination of Palmour and Ueno teach or suggest all the method steps as shown above, therefore, reducing the interface density between the gate oxide and the SiC substrate would flow naturally from the combination of Palmour and Ueno. Hence the 35 USC §103 rejection over Palmour and Ueno stands and is considered proper.

Conclusion

8. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO**

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MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

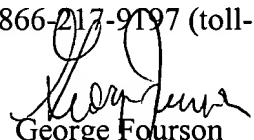
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Fernando L. Toledo whose telephone number is 571-272-1867. The examiner can normally be reached on Mon-Thu 7am to 5:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on 571-272-1855. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



FToledo
28 April 2004



George Fourson
Primary Examiner
Art Unit 2823